Patent Claims

1. A vacuum arc source including a target with a surface for operating an arc discharge, wherein the target is arranged in the effective area of a device producing a magnetic field, **characterized by the fact that** the device producing the magnetic field includes at least two magnet systems with opposite poles and is designed so that the component $B_{\perp}$ of the resulting magnetic field perpendicular to the surface has basically constant values over a large part of the surface or is zero.

2. The arc source in Claim 1, **characterized by the fact that** the value of the perpendicular magnetic field component $B_{\perp}$ is smaller than 30, preferably smaller than 20 and very preferably smaller than 10 Gauss.

3. The arc source in one of the preceding claims, **characterized by the fact that** the greater part of the surface extends from the middle of the target surface to the rim, and so that the greater part includes at least 50%, especially preferred 60% or more of the geometrically determining mass or masses of the target surface.

4. The arc source in one of the preceding claims, **characterized by the fact that** on the rim of the target surface, the values $_{B\perp R}$ of the perpendicular magnetic field component rise, fall and/or change signs compared to the values $B_{\perp M}$ in the middle of the target surface.

5. The arc source in one of the preceding claims, **characterized by the fact that** the value of the parallel magnetic field component $B_{\parallel}$ is basically zero in the middle and in the direction of the rim of the target surface rises or falls, preferably symmetrically in relation to the middle of the target, especially preferred basically rises linearly.

6. The arc source in one of the preceding claims, **characterized by the fact that** the first of the at least two magnet systems with opposite poles includes at least one first electromagnetic coil placed behind the target.

7. The arc source in Claim 6, **characterized by the fact that** the inner dimensions of the first coil basically coincide with a deviation from a maximum of plus/minus 30%, preferably plus/minus 20% with the projection of the outer dimensions of the surface.

8. The arc source in one of Claims 1 to 5, **characterized by the fact that** the first of the at least two magnet systems with opposite poles is comprised of one or more permanent magnets placed behind the target.

9. The arc source in Claim 8, **characterized by the fact that** the permanent magnet or magnets themselves have low field strength, or have a distance from the target such that the field strength on the surface of the target is low.

10. The arc source in one of the preceding claims, **characterized by the fact that** the second of the at least two magnet systems with opposite poles has at least one second coil arranged coaxially to the first magnet system.

11. The arc source in Claim 10, **characterized by the fact that** the second coil is placed behind the first magnet system.

12. The arc source in Claim 10, **characterized by the fact that** the second coil is placed at some distance in front of the target.

13. The arc source in Claim 10, **characterized by the fact that** the second coil includes the first magnet system at least partly coaxially.

14. The arc source in one of Claims 10 to 13, **characterized by the fact that** the second coil has a higher number of windings and/or a larger diameter than the first coil.

15. The arc source in one of the preceding claims, **characterized by the fact that** the target is connected as a cathode.

16. The arc source in one of the preceding claims, **characterized by the fact that** the target is connected as an anode.

17. A vacuum system in which at least one arc source is arranged according to one of Claims 1 to 16.

18. The system in Claim 17, **characterized by the fact that** the at least one arc source works in the direction of the axis of the system and has at least one other electromagnetic coil arranged concentrically to the axis of the system in order to deflect the plasma beam produced.

19. The system in Claim 18, **characterized by the fact that** the at least one other coil is connected to at least one time-altered current source with a control unit, in order to deflect the alignment of the plasma beam produced by the at least one arc source variably.

20. The system in one of Claims 18 to 19, **characterized by the fact that** at least two other electromagnetic coils, preferably in the upper and lower or corresponding areas laterally bordering the system are arranged concentrically to the axis of the system and have a different or the same diameter or a design basically corresponding to a Helmholz coil arrangement.

21. A method of operating an arc discharge on the target surface of an arc source using a device producing a magnetic field, **characterized by the fact that** a magnetic field is produced on the surface with the device for producing a magnetic field, whose perpendicular component $B_{\perp}$ runs over a large part of the surface basically constant near or at zero.

22. The method in Claim 21, **characterized by the fact that** the value $B_{\perp}$ of the perpendicular magnetic field component is set to be smaller than 30, preferably smaller than 20 and more preferably smaller than 10 Gauss.

23. The method in one of Claims 21 to 22, **characterized by the fact that** the magnetic field is set so that a large part of the surface with component $B_{\perp}$ running basically constantly near or at zero extends from the middle of the target surface to the rim, so that the middle area includes at least 50% and especially preferred 60% or more of the geometrically determining mass or masses of the target surface.

24. The method in one of Claims 21 to 23, **characterized by the fact that**, the values $B_{\perp R}$ on the rim of the target surface of the perpendicular magnetic field components are set to rise, fall and/or change signs compared to the values $B_{\perp M}$ in the middle of the target surface.

25. The method in one of Claims 21 to 24, **characterized by the fact that** the value of the parallel magnetic field component $B_{\parallel}$ is basically set at zero in the middle and in the direction of the rim of the target surface rises, preferably symmetrically in relation to the middle of the target, so that the force acting tangentially on the spark clockwise or counter-clockwise rises toward the rim of the target.

26. The method in one of Claims 21 to 24, **characterized by the fact that** a magnetic field basically perpendicular to the surface is also produced in an area in front of the target.

27. The method in one of Claims 21 to 26, **characterized by the fact that** the magnetic field strength is set to correspond to the target material and/or target thickness.

28. The method in one of Claims 21 to 27, **characterized by the fact that** the device producing the magnetic field includes at least one coil placed behind the target, and a voltage source is applied to at least one coil to adjust the magnetic field, so that current flows in the first direction.

29. The method in one of Claims 21 to 27, **characterized by the fact that** the device for producing the magnetic field has at least one magnet system made up of one or more permanent magnets placed behind the target.

30. The method in one of Claims 28 to 29, **characterized by the fact that** at least one second coil is placed behind, in front or around the target, and to adjust the magnetic field, a voltage is applied to the second coil, so that a second magnetic field is produced that is directed opposite the magnetic field produced by the first magnet system.

31. A method of coating a workpiece, especially a tool and/or a component, using one of the methods in Claims 20 to 29.

32. A method of coating a workpiece, especially a tool and/or a component using the arc source in Claims 1 to 16.